RUG3 Applications

**WATER SYSTEM TELEMETRY**
- Tank sites
- Filter plants
- Booster stations
- Pump controls
- Lake and stream monitoring

**WEATHER MONITORING**
- Flash flood warning
- Snowpack monitoring
- Reservoir levels
- Stream flows
- ALERT or 2-way
- Cloud seeding

**WASTEWATER SYSTEM TELEMETRY**
- Lift stations
- Treatment plants
- Pump controls
- Effluent monitoring
- Chemical feeds

**SHIP MONITORING**
- Mothball fleet
- Intrusion alarms
- Flood alarms
- Fire alarms

**PETROLEUM SYSTEMS**
- Wellhead safety
- Tank farms
- Gas flow
- Fuel level/flow
- Spill detection

**IRRIGATION SYSTEMS**
- Remote pump control
- Alarm monitoring
- Pivot control

**CANALS**
- Flow rates
- Gate position
- Valve control

**DATA LOGGING**
- 524K Bytes
- Non Volatile Flash Memory
- Stores a mix of Time Tags, Integers and Floating point.

**INDUSTRIAL**
- Process monitoring
- Gas leak detection
- Test monitoring
- Alarm monitoring
- Process control

**DAM SAFETY**
- Flood warning
- Dam integrity
- Inflow/outflow monitoring
- Gate position
OPERATOR INTERFACE

The built in operator interface uses familiar prompts and engineering units display, eliminating operator guesswork and code memorization. The 2x16 character backlit display can scroll through several screens of information with a single keypress.

The sealed tactile keyboard enables setpoint changing.

LOW POWER CONSUMPTION

The RUG3 draws as little as 3 milliamps in full operation. This includes the display on, running at full speed and with the modem working. The relays, backlight, and loop supply increase the power draw.

RUG3 CPU

The CPU is integrated and has 2K of battery backed RAM, 60K of program FLASH and 512K of logging memory. The RUG3 is configured using preprogrammed modules in the same manner as the RUG5 and RUG9. The operating system can be field upgraded using the latest version available at no charge from our website (www.rugidcomputer.com).

BUILT IN I/O

The RUG3 includes a wide variety of I/O. Six analog inputs are available with one being selectable as an anemometer input. The analog inputs are 0-5v or 4-20ma, 12 bit resolution. Eight digital inputs are standard and they can be used for pulse counting (128pps) and pulse duration detecting (4ms). Four 10 amp relay outputs are provided. The RUG3 also features a dedicated port for loading programs and a modem/RS232 port for communication purposes. A 24v loop supply is standard.
**RUG3 Styles**

**RUG3BL (Board & LCD)  RUG3P (Panel Mount)**

- 2X16 Character Backlit LCD
- Lithium Battery backup for RAM and Real Time Clock
- Onboard Modem
- 2 Serial Ports
- 24 Volt regulated Loop Supply
- Four Relay Outputs

**RUG3D (DIN Rail Mount)**

- 8 Digital Inputs
- 6 Analog Inputs

The RUG3 easily slides onto a DIN rail. No tools are required for mounting or removing it.

**RUG3C (DIN Rail Mount No Display)**

Springs keep the RUG3 secured to the DIN Rail.
Step 1: Setup I/O properties. The name you enter becomes signal name in the database.

Step 2: Design control strategy, drag inputs from databases or type in values.

Step 3: Send program to RUG3
**RUG3 Specifications**

**LOGIC Family**
All low power CMOS

**MICROPROCESSOR**
16-bit MSP430, 8 MHz, 16 bit data bus, 16-bit address bus

**MEMORY**
- RAM: 2 Kbytes battery backed low power static RAM
- Program FLASH: 60 Kbytes
- Logging FLASH: 512 Kbytes

**Battery Backup**
Lithium coin cell backs up RAM & real-time clock calendar min 2 year.

**DISPLAY**
- 2 line X 16 char backlit LCD, sunlight readable, backlight switchable by software.

**KEYBOARD**
- 16 key sealed tactile membrane with interrupt scanning.

**REALTIME CLOCK CALENDAR**
Battery backed clock/calendar 0.005% crystal accuracy

**OPERATION SECURITY**
- Watchdog Timer-Hardware timer resets unit .5 seconds after interrupt fails. Cannot be disabled
- Telemetry Watchdog-Resets rev buffer if no character received within 1 sec.
- Brownout Detector-Halts process if logic voltage falls below 2.7 V, restarts when voltage rises to 3 V.

**AUTOBOOTING**
Auto startup on power application.

**ANALOG INPUTS-12 bit**
- 6 channel per board, 12 bit res., successive approx, 4-20 ma. or 0-5 v. Factory calibrated.

**DIGITAL INPUTS**
- Status- 8 chan, dry contact compatible, self powered.
- Pulse Counting-all DI count 128 FPS
- Pulse Duration Detecting-all can convert pulses to analog with 4ms resolution.

**DIGITAL OUTPUTS**
- 4 ch, 10 amp relays
- Pulse Duration Outputs-Relays can generate pulse width modulated or one shot signals with 4 ms res.

**ANEMOMETER INPUT**
A16 connected to clipping amp, counted to derive windspeed

**REFERENCE OUTPUT**
2.5 VDC reference available to power potentiometers, shares pin with DI8.

**INSTRUMENT POWER**
Loop supply switchable to battery voltage and can be switched on/off by software. Diode isolated.

**SERIAL PORTS**
- One programming/gen purpose port plus one RS232/ modem port

**MODEM**
Bell 103 standard/ALERT standard

**Radio Interface**
- 4-wire audio, adj. gain, xformer isolated, optically isolated key line. Low tones mode for splinter chan.

**Phone Line Interface**
- 4 wire audio adjustable gain, transformer isolated

**Transmit power**
- 0-4Vp-p, software adjustable in 256 steps

**COMMUNICATIONS**
- ASCII-standard
- R9 protocol-Background CRC gen/decode, variable length messages, user defined message lengths. Can combine status, integer, float, in any message.
- ALERT protocol-standard
- Eavedrop Mode-R9 protocol, any RTU can accept data passing between any other stations

**Peer to Peer-** Fall RTU to RTU or RTU to master or master to RTU messaging

**Store and Forward-** Scheduling station selects path through up to 3 intermediary stations

**Address Range-** 1 to 254

**POWER INTERFACE**
- 12 VDC +/-20%, diode isolated. 4 ma normal operation (relays, loop supply and relays off) to 440 ma max.

**LOOP SUPPLY**
Built in switchable regulated 24 VDC +/-5%, 120 ma

**I/O CONNECTIONS**
- All I/O uses removable rising cage screw headers in banks of up to 10 each, 14 ga wire. Modem signals use RJ45 jack

**SOFTWARE**
- Storage-operating system and all user configuration and programming stored in nonvolatile flash memory.
- Flash loader stored in flash protected boot block.
- Security-parameter voting and memory integrity test on boot up, CRC gen' detect on serial ports. Program loading CRC protected.
- Scanning-Built in software scans all I/O ports, timers, real-time clock.

**PROGRAMMING**
- Modules-applications use precompiled modules resident in flash memory where programmer interconnects modules and sets properties using supplied Win95/98/NT/XP program. No procedural programming required for most applications.

**LADDER LOGIC**
Ladder logic is built in to the WIN95/98/NT/XP configuration program to handle misc controls

**DATA LOGGING**
Logs floating point, integer and status samples with time tags to onboard flash eeprom.

**VARIABLES**
Supports 16 bit integer, 32 bit floating point, boolean, strings.

**ERROR MESSAGES**
Configuration handles all setup errors. Run time software is self protecting... no run time errors.

**ENCLOSURE**
16 ga. steel, blue powder coat DIN rail mountable.
- Case: 4.6 X 3.6 X 1.3 in. Panel mount flange 6.0 X 4.75 In.

**TEMPERATURE RANGE**
-40 to +85 deg. C logic
-20 to +60 C LCD display

**DOCUMENTATION**
210 page manual on CD.

**WARRANTY**
1 year std limited warranty

**REPAIR**
Nominal 24 hour turnaround

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